

Applying FCM's Guide for Integrating Climate Change and Asset Management

AMONTario Climate Change and Asset Management Conference

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Risk and Opportunity

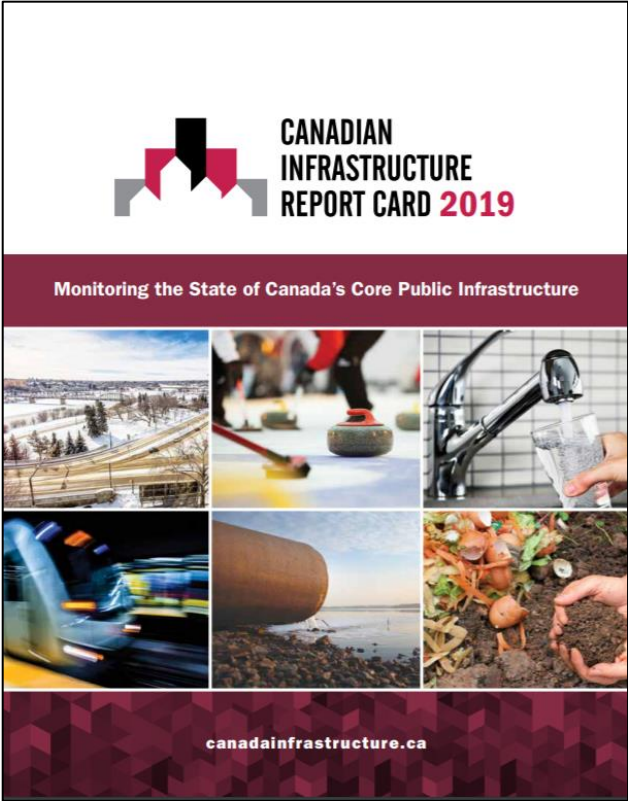
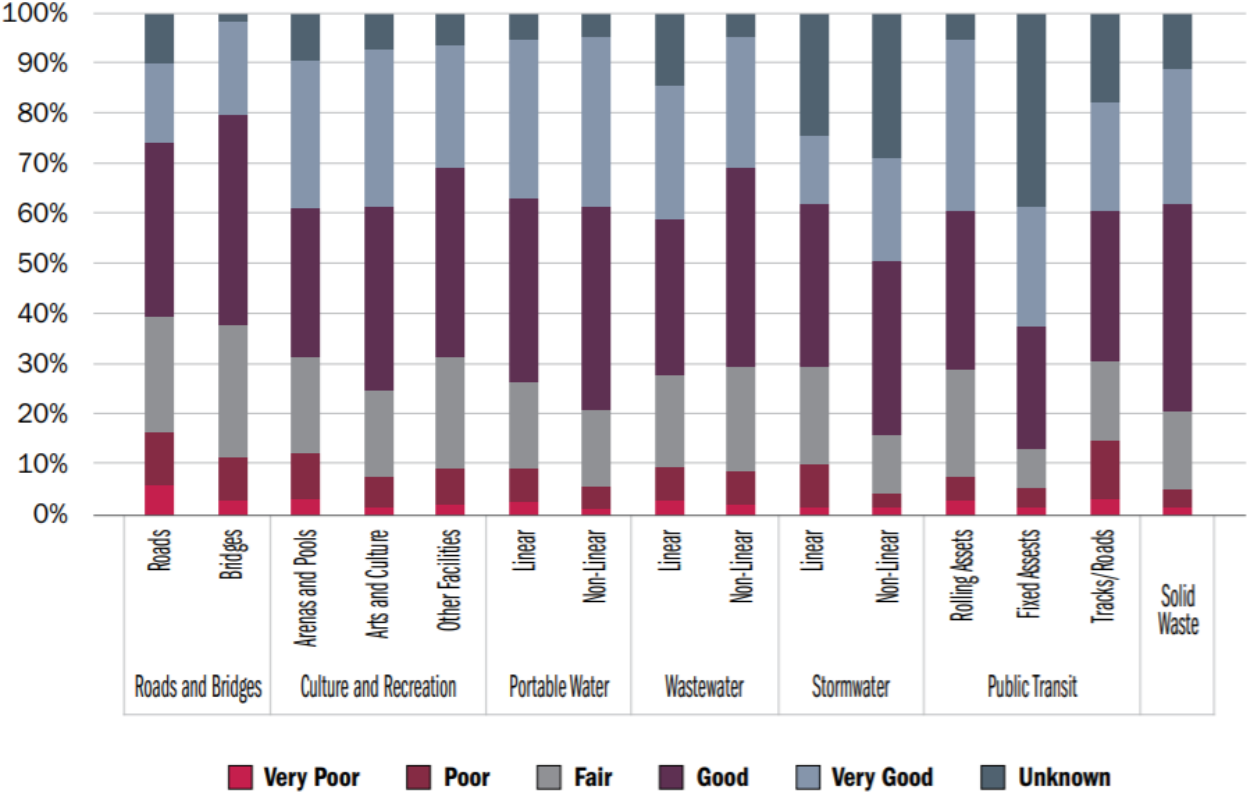
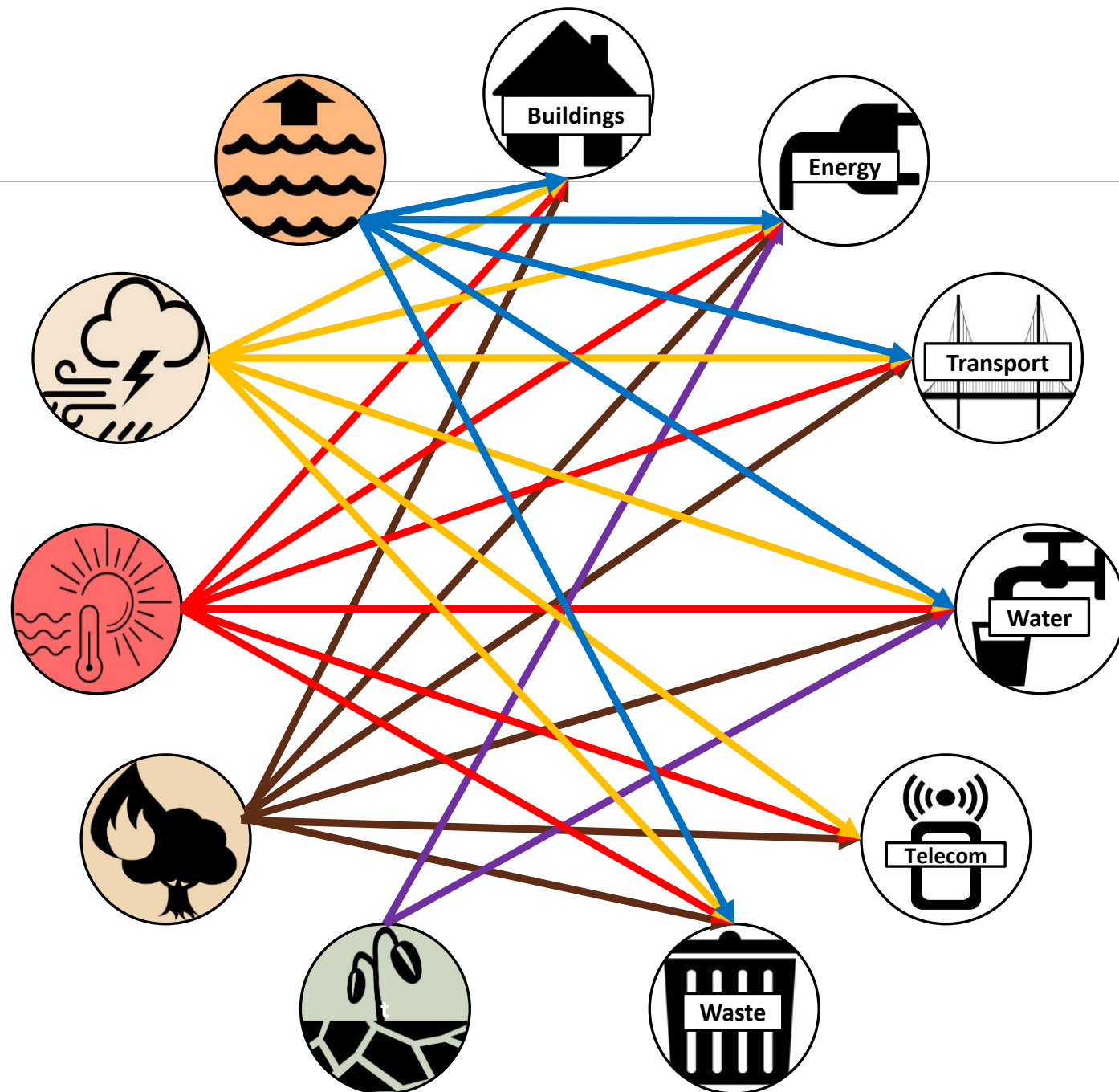


Figure 1: Core Infrastructure Asset Condition Summary



Risk Cannot be Inferred by Condition Alone





O. Reg. 588/17: Strategic Asset Management Policies

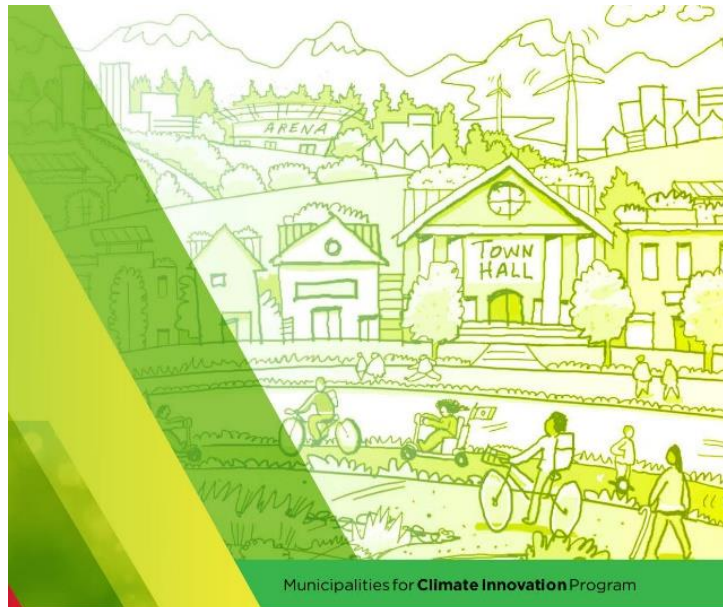
5. The municipality's commitment to consider, as part of its asset management planning,
- i. the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as,
 - a) operations, such as increased maintenance schedules,
 - b) levels of service, and
 - c) lifecycle management,
 - ii. the anticipated costs that could arise from the vulnerabilities described in subparagraph i,
 - iii. adaptation opportunities that may be undertaken to manage the vulnerabilities described in subparagraph i,
 - iv. mitigation approaches to climate change, such as greenhouse gas emission reduction goals and targets, and
 - v. disaster planning and contingency funding.

Acknowledgements

- Saint John, NB
- Fredericton, NB
- Ville de Saint-Quentin, NB
- Bromont, QC
- Halton Hills, ON
- Guelph, ON
- Kitchener, ON
- Kenora, ON

Selkirk, MB
Cowichan Valley Regional
District, BC
Nanaimo, BC
FCM's MAMP TWG
OSM Illustration
Kerr Wood Leidal





Municipalities for Climate Innovation Program

Guide for Integrating Climate Change Considerations into Municipal Asset Management

FCM
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FEDERATION OF CANADIAN MUNICIPALITIES

Learning Journey: Climate Resilience and Asset Management

fcm.ca/climateinnovation



CONSIDERING CLIMATE CHANGE IN RISK MANAGEMENT

Our communities are becoming increasingly vulnerable from the hazards posed by a changing climate. The ways in which a community is vulnerable depend on factors such as the services provided, local industry, population, historical planning decisions, community health, area, and geographic location. Municipalities provide a wide variety of services that support the people, the future, and the environmental health of communities. New hazards as a result of changes to our climate have begun impacting the way municipalities deliver services.

So, how can we improve your community's resilience? Consider integrating climate change with asset management, through a risk assessment process.

Hazards are physical events or phenomenon that may have a negative impact, such as habitat damage, injury or loss of life, economic disruption. Climate-related hazards include, but are not limited to:



Flooding
Sea level Rise
Coastal Erosion



Extreme Temp
Permafrost Deg
Hailstorms



Wildfire
Drought
High Winds

Benefits of climate integration

Communities become more resilient by assessing and managing risk with a climate change lens. Benefits include:

- Ensuring that the most critical services in the community will be available when needed in the future;
- Prioritizing limited resources (staff, time, money) to achieve the highest value at the lowest cost;
- Making decisions grounded in evidence; and,
- Enabling proactive versus reactive decisions over the lifecycle of assets.

It's a balancing act

One way that you can increase your community's resilience to climate change is by documenting and managing infrastructure related risks. This needs to be balanced with levels of service, costs, and time.



What is risk?

Risk is the potential for undesirable outcomes resulting from an incident, event, or occurrence. It is commonly evaluated as a combination of the consequence and likelihood of an event, such as a service disruption or asset failure.

Assessing climate-related risks to infrastructure services involves understanding how natural and built systems are affected when exposed to hazards, where systems are most vulnerable, and the associated impacts or consequences.¹

¹ Envision, Sustainable Infrastructure Framework Guidance Manual 3rd edition (Washington DC: Institute for Sustainable Infrastructure, 2019), 170-171.



CONSIDERING CLIMATE CHANGE IN LEVELS OF SERVICE

The climate influences almost everything about how we design, build, and live in our cities. Communities are facing unprecedented impacts from climate change, which is affecting how municipalities deliver services. Infrastructure assets are the foundation upon which we deliver these services.

The level at which we can reliably deliver services now, and into the future, is dependent on the capacity and condition of our municipal infrastructure. The effects of severe storms, flooding and other unexpected events strain the capacity of our infrastructure in ways that could not have been predicted when it was designed.

So, how can services be delivered sustainably into the future? Consider integrating climate change with asset management, through levels of service.

Benefits of climate integration

We can take key steps towards becoming more resilient by integrating climate change considerations into our decision-making processes. Benefits include:

- Clearly articulating what community members can and can't expect the municipality to do;
- Focusing public spending in the areas where the best value can be provided; and
- Ensuring both short- and long-term needs can be met.

It is a balancing act

One way that we can increase a community's resilience to climate change is by documenting and managing levels of service. This needs to be balanced with risks, costs, and time.



What are levels of service?

Levels of service are specific parameters that describe the extent and quality of services that the municipality provides to users. Levels of service largely dictate the need for infrastructure, resources (e.g. staff, time, funding, or materials), and ultimately the costs of providing a service. Factors that influence levels of service include local conditions, priorities of decision makers, and customer expectations. Levels of service can be described in terms of the following characteristics:

- **Regulatory** - Does the service comply with applicable laws?
- **Capacity/availability** - Is there adequate capacity to meet the needs of users?
- **Safety** - Is the system safe for workers and the public?
- **Quality** - Does the service meet quality standards? How good is it?
- **Reliability** - Is the service reliable? How often is it interrupted?
- **Sustainability** - How does the service provide for quality of life, leadership, resource use, natural environment, and resiliency?

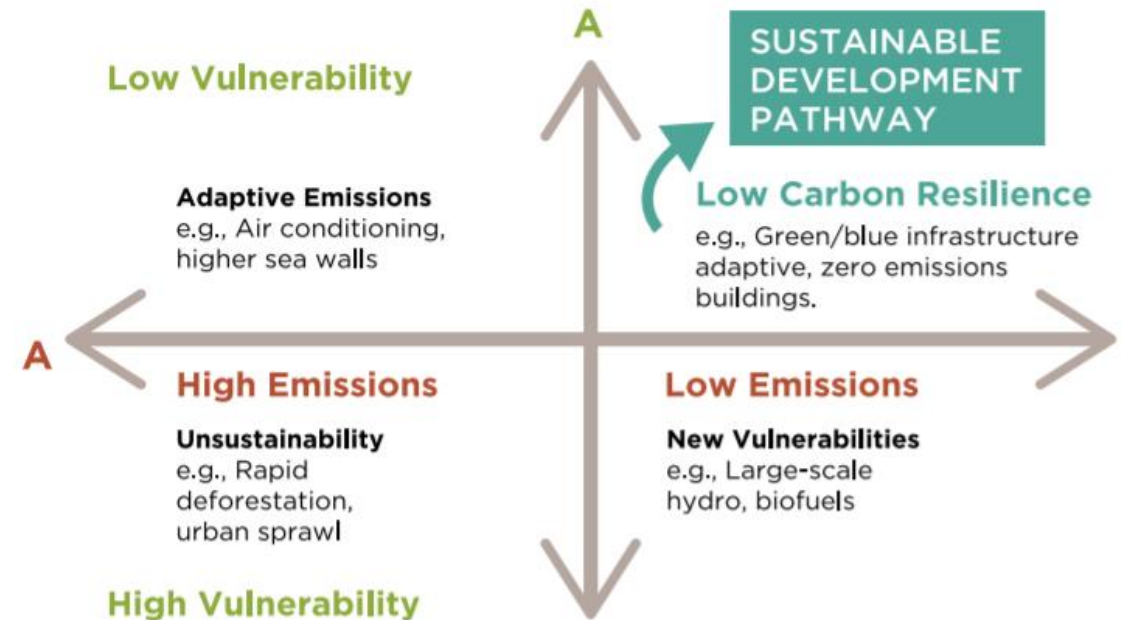


AMONTario
ASSET MANAGEMENT ONTARIO

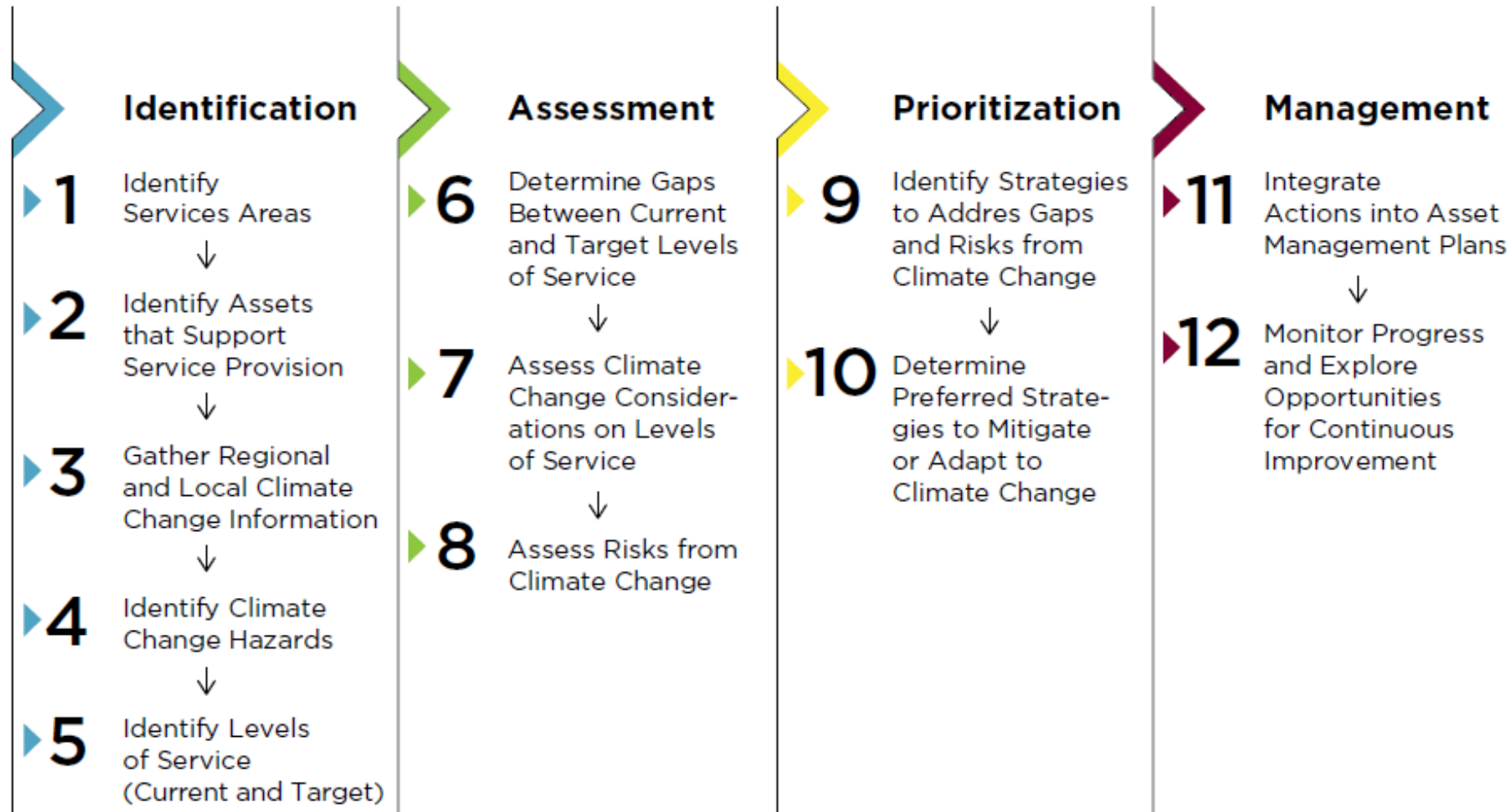
CHAPTER 2

Integrating Climate Change Considerations into Decision Making

- How is climate change affecting infrastructure?
- How do adaptation and mitigation strategies play a role?
- Why integrate mitigation and adaptation?
- How to integrate mitigation and adaptation strategies



The Framework



The purpose of this process is to answer:

1. How will climate change impact our municipality?
2. How will it affect our ability to deliver municipal services?
3. How do we prepare for the future?

Entry Points

11-12
9-10
6-8
1-5



Begin from the ground up

6-7
1-5



Start with levels of service

9-10
8
1-4



Focus on risk management

9-10
7-8
3-4



Adapt an existing framework

Figure 2: Levels of Service Pyramid

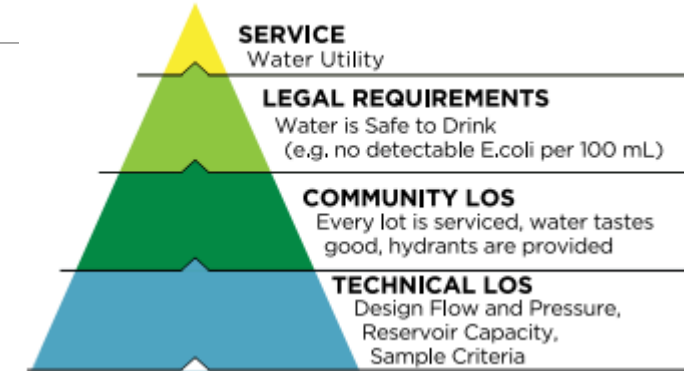
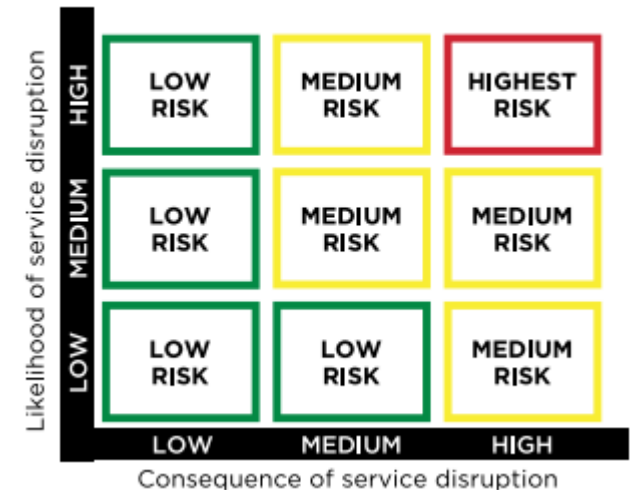


Figure 1: Risk Matrix



Hazards are physical events or phenomenon that may have a negative impact, such as habitat damage, injury or loss of life, economic disruption. Climate-related hazards include:



Erosion



Landslides



Drought



Flooding



Sea Level Rise



Storm Surges



Permafrost
Degradation



Extreme
Temperatures



Wildfire



Hailstorms



High Winds



Severe
Weather

Hazard-oriented
rather than asset-
oriented perspective
of risk

Municipal Case Studies

Municipal Staff in Action

Jessica Angers, the Manager of Corporate Asset and Project Management with the City of Guelph, has implemented quarterly reporting on key levels of service projects and phases through these three steps:



The biggest climate change hazards affecting Saint-Quentin are heavy rainfall, more frequent forest fires, harsher and less predictable winters, and drought.

The City began integrating climate change considerations into risk management in 2015 to determine how best to address these hazards; however, their commitment to sustainable community planning can be seen much earlier through the Green Municipal Plan developed in 2008.

Saint-Quentin has asset management policies, an inventory, a corporate program and an action plan (with clear priorities) in place. They have



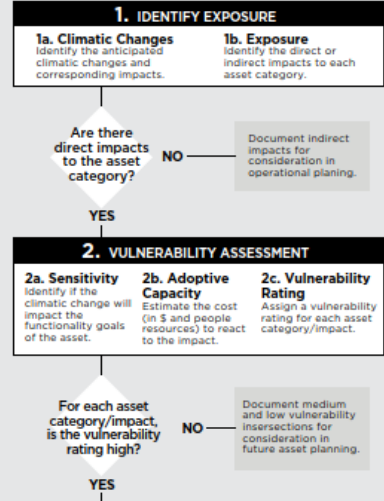
Municipality in Action



The CVRD is currently conducting climate risk assessments and has identified over 100 infrastructure assets that are vulnerable to climate change impacts, across 12 asset systems. All staff, from operations to senior management, were engaged from the beginning of the process and used workshops for education and buy-in.

Having a simple framework, and definitions that everyone agrees on has been key. The project team determined that although none of the existing frameworks they reviewed met all of their project criteria, the ICLEI Canada tools provided a good starting point for modification. These tools were used and adapted to develop a custom process for CVRD—an asset system vulnerability and risk assessment that was conducted using this four-step process:

1. Identify Exposure
2. Vulnerability Assessment



The City of Selkirk's award-winning Climate Change Adaptation Strategy (CCAS) provides a comprehensive, practical and cost-effective plan for beginning to address the impacts of climate change on municipal services and citizens. This work has been integrated into the City's Capital Asset Management Program (CAMP), as well as existing business planning processes, to support clear actions for adaptation over the next 50 years. Selkirk's CCAS was adopted in May of 2019 and the City is now beginning to implement the tactics laid out.

One of the key take-aways from their experience

Fredericton



River Watch 2019: Are you Prepared?

"Balancing what we need, what we can provide, and what the public expects" are all important considerations when preparing a service delivery plan.

Fredericton, NB



The Town of Halton Hills is working to develop and implement climate change adaptation and mitigation measures relating to service levels. One area of focus is centred around sustain-

The Town of Halton Hills has since taken action:

1. They have integrated Climate Change and Asset Management under one department reporting to the CAO's Office to ensure there are synergies and minimize conflicts between the two programs.
2. They have adopted an Integrated A+M approach that will not only consider adaptation and mitigation measures to combat climate change but also integrate whole lifecycle asset management strategies and financial planning.

Halton Hills, Ont



The City of Kenora staff have recognized the need for continuous improvement in asset management planning, data gathering and management, and in decision making.

Kenora has an asset management framework in place and has included climate change risk as part of the document. The process identifies risk—what constitutes a risk, formalized risk assessment process—and the degree of information and data competencies required. It also includes risk management—deciding what actions need to be taken to achieve "low regret" situations and implements a strategy to adapt accordingly.

The remaining challenge is how to effectively use the risk reports which are generated by the AMP software and the considerations of those climate variables within capital decision-making.

The next steps are to draw from their background studies and frameworks to focus on prioritization and management. The City is looking to keep the process simple as they adapt due to the nature of being a smaller community. The momentum from work completed to date will kick start the solutions and actions specific to the vulnerabilities that have been identified.

Kenora, ON

AN INTEGRATED A+M APPROACH



The City of Bromont is in the early stages of their climate change response process and recognize that climate change is far more complex than simply variations in the weather. Key questions they have raised for consideration when gathering climate data include:

1. What is the most reliable data? Most available?
2. What measurement units are being used/most useful (e.g., days of extreme heat, violent rainfall, freeze-thaw cycles)?
3. How will forecasts be selected?
4. Should the most optimistic or pessimistic scenarios be used?

Bromont, QC

Adopt, Implement, Monitor and Review

Prepare Adaptation Plans



Municipality in Action



In order to identify the effectiveness of current services provided, the City of Nanaimo brought together focus groups asking what the level of service is today for parks/trails, and then what level it should be at. The City also hosted community engagement workshops with residents on how levels of service relate to their parks and trail systems specifically. They realized that the public is interested in learning more about service provision, cost, and sustainability.

Commitments can now be established, and monitoring will continue to ensure the City is meeting the needs of the community through exceptional, sustainable service delivery.

Nanaimo, BC

Samir Yammine has been working with the City of Saint John for 20 years. His role began as Energy Manager, and has evolved to Manager of Asset Management.

He was an early adopter of an Efficiency Energy Program, reduced the City's energy almost \$2.5 million and cut tonnes of carbon emissions under his leadership.

He believes that there are still opportunities that will City targets. He is working towards solutions with the City by taking an integrated approach to asset management and change.

John was new to asset management in 2016 and has moved forward. The City's approach for climate integration is on risk management as the Climate Change Action began with a vulnerability assessment of drainage infrastructure (pilot) which resulted in a methodology for assess-

have been completed. The project team recognized the need to allocate resources to commission systems at once. Vulnerable systems were identified and enabled them to build internal asset systems, recycling, developing work that did not who is the procedure for other recommendations for other journey: it needs to be managed. Available, it can be updated. Climate risks—hence the framework. District, B.

In 2015, the City of Kitchener partnered with the University of Waterloo and together assessed over 20+ years of severe weather data, historical trends, future climate projections and weather forecasting. Gaps in the data are being identified, and temperature and precipitation rates analyzed. The intention is to prepare for these events proactively by considering climate impacted levels of service and the implications for municipal assets.



Moving forward, Kitchener is exploring how best to bring sustainable practices to a variety of municipal assets, as well as looking at how to utilize performance data. Specific work activity projects are created in their work management system to better understand the impacts of adverse weather events. Furthermore, they are working to engage stakeholders more fully into levels of service discussions.

Kitchener, ON

Resources

APPENDIX A

Glossary of Terms

APPENDIX B

LOS Checklist for Climate Impacts

APPENDIX C

Additional Resources

Common Impacts of Climate Change on Local Government Infrastructure Systems

Sewer Impacts

- ☐ Exceeded capacity caused by increased inflow and infiltration (may lead to surface surcharging and basement flooding)
- ☐ Changes in the characteristics of wastewater effluent
- ☐ Flooding that affects buildings, tankage, and housed process equipment

Health/Emergency Services Impacts

- ☐ Higher demand for emergency services
- ☐ Damage or flooded emergency services structures
- ☐ Longer response times
- ☐ Reduced aid capacity

Transportation Impacts

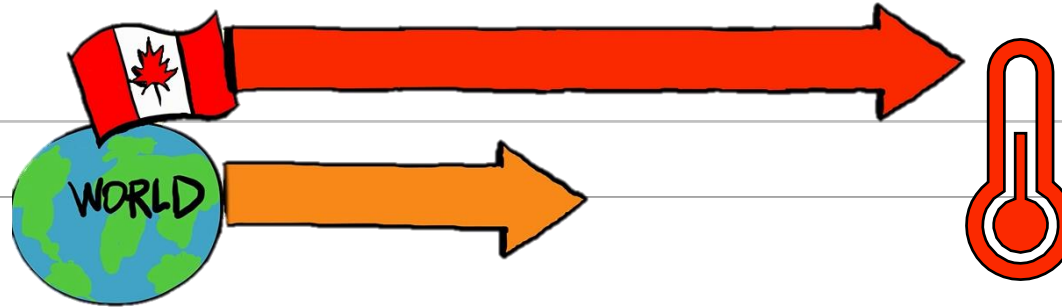
- ☐ Road damage caused by erosion, landslides, and embankment failure
- ☐ Road damage caused by more frequent thawing/freezing of soil
- ☐ Road washout caused by overflowing culverts and storm sewers
- ☐ Causeways, bridges, and low-lying roads have a high risk of being inundated or damaged

Drainage Impacts

- ☐ System capacity exceeded more frequently
- ☐ Failure of drainage systems and dikes causing property and infrastructure damage
- ☐ Increased pumping (which increases energy costs)

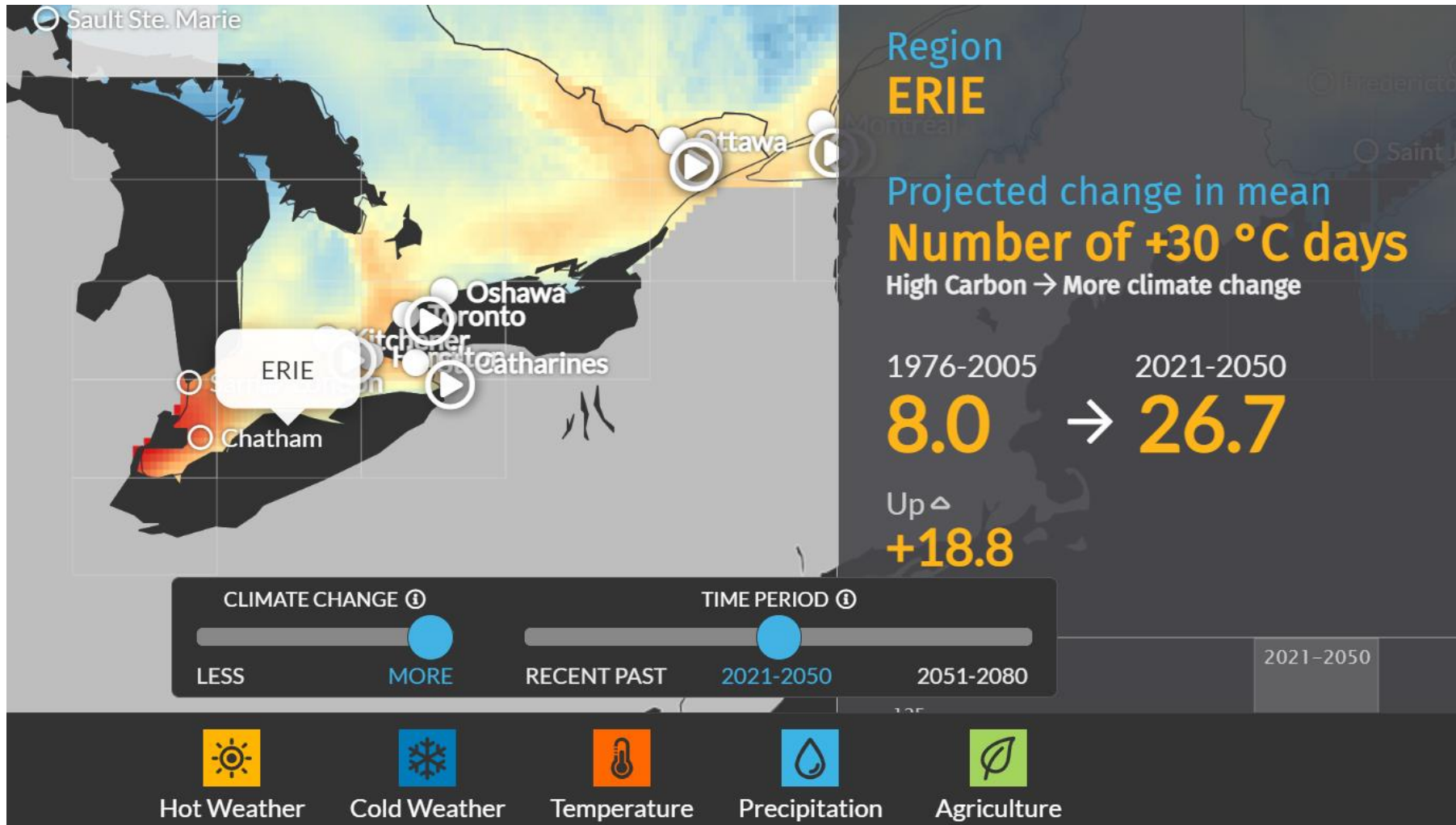
CHAPTER 6

A Call to Action



- ▶ Municipalities are facing the biggest impacts from climate change **BUT** that means you are in the drivers seat for making real change
- ▶ Huge opportunity for building long term climate resilience in communities
- ▶ The climate affects how we design, build and live in our communities
- ▶ Aged infrastructure is an opportunity to ensure new investments are made with the future in mind
- ▶ How can you make an impact?
 - ▶ Review the 15 Lessons Learned
 - ▶ Share the video!
 - ▶ Concrete steps in Guide

Application



Climate Hazard: Extreme Temperatures

Menti.com
XX XX XX



A serene landscape photograph of a calm lake. In the foreground, a wooden canoe with the name "Prospector" on its side is pulled up to a rocky shore. A wooden paddle rests across the canoe. The water is still, reflecting the sky and the dense forest of evergreen and deciduous trees on the opposite shore. The sky is overcast with soft, diffused light.

Thank you

Questions?

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